

Type I Progress Report

ERTS-A

NASA-CR.131529

- a. Title: Overall Evaluation of ERTS Imagery for Cartographic Evaluation

ERTS-A Proposal No: MMC 233

- b. GSFC ID No. of P.I.: IN 014

- c. Problems:

Those reported as of Jan. 1 (Phase II) still remain to some extent. However, more and more suitable coverage of test sites within the U.S. is being received so that compilation of actual products have started. Block coverage of polar regions is still inadequate. Direct response by the public on the application of ERTS to cartography is still lacking - although several private firms have indicated that they have started map production from ERTS imagery.

- d. Accomplishments and Plans:

Specific accomplishments and plans covered by the individual experiment Nos. 116, 149, 150, 211 and 237 in turn contribute to this investigation. The recent receipt of a large number of precision processed imagery should assist in the accomplishment of all of the listed experiments.

A summary of the status of the five specific experiments is as follows:

1. Photomapping of the U.S. (NASA #211). In the last few weeks we have received imagery which appears adequate to cover the

Arizona and CARETS test areas. We feel sure we can put out a standard quadrangle orthophotoquad that will meet National Map Accuracy Standards (NMAS) at 1:1,000,000 and perhaps at 1:500,000 scale. We cannot achieve NMAS at 1:250,000 scale unless some substantial improvements are made in the geometry of the MSS bulk imagery. MSS precision imagery is not much help at scales larger than 1:1,000,000 because of the degraded image quality. RBV imagery, if available, would simplify the mapping problem but we doubt that it could be used at larger than 1:500,000 scale.

2. Map Revision (NASA #237) This experiment is already bearing fruit and ERTS imagery is currently being used in the actual revision of 1:250,000 and 1:500,000 scale maps. It will also be applied to 1:1,000,000 scale as soon as such maps come up for revision. What is most important (and unexpected) is that ERTS in some cases is indicating those areas where we must revise our 1:24,000 scale maps. This promises to be of direct economic value as we are now flying some high altitude aerial photography for this very purpose.

3. Basic Thematic Mapping (NASA #116) We have enough confidence in thematic mapping that we are establishing a thematic capability at our EROS Data Center at Sioux Falls, S.D. Extraction of basic themes has been achieved on the MSS imagery. The next step is to establish the form and procedures. We have not, at this point, determined just what the final products from this technique should be.

4. Polar Region Mapping (NASA #149) We have not received enough suitable imagery to map any sizeable area of either polar region as yet. However imagery now arriving of Antarctica show significant errors and changes to the existing maps. This means that new Antarctica mapping based on ERTS is undoubtedly needed and can be accomplished for a fraction of what equivalent mapping is now costing. In the Arctic, mapping is needed to show temporal changes in a timely manner. ERTS has already indicated that huge areas in the Bering Sea assumed to be ice covered (except for the summer) are in fact basically ice free and should be so mapped.

5. Mapping from Orbital Data (NASA #150) The shut down of the RBV's has materially curtailed this experiment as planned. Efforts have been diverted to studying the geometry of the MSS image before trying to apply it to mapping without the benefit of ground control. NASA indicates they are determining image centers to within  $\pm 2$  km in each of the two cardinal directions and our examination tends to confirm this figure. For independent mapping purposes (even at 1:2,000,000 scale) this figure must be reduced to below 1 km which may or may not be possible from ERTS-1.

e. Scientific conclusions and results:

As reported in Phase II report.

f. Published articles and reports:

- Progress in Cartography, EROS Program (Colvocoresses and McEwen) presented at the ERTS-1 Symposium March 1973
- Two memoranda for the record. EROS Cartography numbered memos EC-14 and 15.

g. Recommendations: (See Phase II Report) plus the following:

- A definitive test to compare large scale printing of ERTS imagery directly from digital tapes as compared to optimum optical processing from the original scale of 1:3,369,000.
- The use by NASA of suitable polar projections for indexing ERTS imagery that falls at latitudes higher than (perhaps) 60°.
- Continued experimentation by NASA to improve the geometry of bulk imagery and the perceptual quality of precision processed imagery. This should include an experiment by NASA to modulate the EBR based on the corrections obtained from ground control as applied to precision processing. By applying these corrections to the EBR a product that combines the image quality of the bulk process and the geometry of the precision process should be achieved. Results from such an experiment should be sent to Colvocoresses or McEwen in the USGS for detailed analysis and comparison with similar products produced by Canada.

h. - k. N/A